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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/896,836	07/02/2001	Hans Leysieffer	740105-68	5870

22204 7590 12/10/2003

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EXAMINER

HARPER, V PAUL

ART UNIT	PAPER NUMBER
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2654

10

DATE MAILED: 12/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

TS

Office Action Summary

Application No.

09/896,836

Applicant(s)

LEYSIEFFER ET AL.

Examiner

V. Paul Harper

Art Unit

2654

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Objections

1. All relevant objects are withdrawn as being satisfied.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 6, 7, 10, 13, 14, 17, 19 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels et al. (US Patent 6,047,074), hereinafter referred to as Zoels, in view of Leonhard (US Patent 5,884,260), hereinafter referred to as Leonhard.

Regarding claim 1, Zoels discloses a programmable hearing aid, which includes the following features: an input acoustic transducer (Fig. 1 2, col. 2, Ins. 1-6), which corresponds to "at least one acoustic sensor for picking up an acoustic signal and converting it into an electrical audio signal"; a signal processor 7 with amplification 6 and a necessary power supply (Fig. 1, col. 2, Ins. 1-6), which corresponds to "an electronic signal processing unit for audio signal processing and amplification, an electrical power supply unit which supplies individual components of the system with

Art Unit: 2654

current"; an output transducer 5 producing a signal for correcting a hearing impairment (col. 2, Ins. 1-11), which corresponds to "an actuator arrangement which is provided with at least one output actuator selected from the group consisting of electroacoustic, electromechanical, and purely electrical actuators, and any combination thereof, for stimulation of damaged hearing". In addition, Zoels invention includes a programmable processor, but Zoels does not specifically disclose, "wherein the signal processing unit has a speech analysis and recognition module and a speech synthesis module."

However, the examiner contends that these features were well known in the art, as taught by Leonhard.

In the same field of endeavor, Leonhard discloses a system for detecting and generating transient conditions in auditory signals. Leonhard's system performs signal analysis, recognition and synthesis (Figs. 8, 19, abstract, col. 1, Ins. 5-20).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing that algorithmic features, as taught by Zoels, for the purpose of improving the quality of the speech signal generated.

Regarding claim 2, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach "the signal processing unit has a digital signal processor which contains software modules for speech analysis and synthesis." However, the examiner contends that these concepts were well known in the art, as taught by Leonhard.

Leonhard's system further performs signal analysis and synthesis within a signal processor (Figs. 8, 19, abstract, col. 1, Ins. 5-20, col. 15, Ins. 49-54), the processor necessarily containing software modules.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing algorithmic features, as taught by Leonhard, for the purpose adhering to standard modular software design practices.

Regarding claim 3, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 2). Furthermore, Zoels indicates that the programmability of the hearing aid offers possible adaptability by replacement of the program (col. 2, Ins. 20-25), and as Leonard teaches (see rejections of claims 1 and 2, above), the analysis, recognition, and synthesis programs are software modules (hence replaceable), which corresponds to "the speech analysis and speech recognition module and the speech synthesis module are adaptive."

Regarding claim 4, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 2). Furthermore, Zoels indicates that the programmability of the hearing aid offers possible replacement of the program (col. 2, Ins. 20-25), and as Leonard teaches (see rejections of claims 1 and 2, above), the analysis, recognition, and synthesis programs are software modules (hence replaceable or re-programmable), which corresponds to "the speech analysis and speech recognition module and the speech synthesis module are re-programmable."

Art Unit: 2654

Regarding claim 6, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach “the speech analysis and speech recognition module and the speech synthesis module are adapted to transmit phonetic categories between them.” However, the examiner contends that this concept was well known in the art, as taught by Leonhard.

Leonhard further discloses that during analysis, recognition and synthesis, signal corresponding to phonemes are used (col. 11, Ins. 1-9, col. 13, Ins. 14-26, col. 15, Ins. 17-24, Figs. 8 and 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically using signal representing phonemes, as taught by Leonhard, since phonetic representation can be used during both recognition and synthesis.

Regarding claim 7, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach “the speech analysis and speech recognition module and the speech synthesis module are adapted to transmit lexical categories between them.” However, the examiner contends that this concept was well known in the art, as taught by Leonhard.

Leonhard further discloses that during analysis, recognition and synthesis, a word/sentence determination can be made (col. 13, Ins. 14-26, Fig. 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically

Art Unit: 2654

providing the use of lexical categories, as taught by Leonhard, since lexical categories can improve accuracy during recognition and can also be useful during synthesis.

Regarding claim 10, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches that the signal processing (used in Zoels specifically for tinnitus treatment, and in Zoels in view of Leonhard for analysis and synthesis) can be enabled and disabled (col. 5, Ins. 19-44), which corresponds to “the speech analysis and recognition module and the speech synthesis module are adapted to be turned off to enable processing of audio signals without speech analysis and synthesis.”

Regarding claim 13, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1). Furthermore, Zoels teaches that the hearing aid system can be used for tinnitus therapy (i.e., programmed for the masking of the tinnitus) (col. 1, ln. 64 through col. 2, ln. 55), which corresponds to “the signal processing unit contains software modules adapted to enable masking of tinnitus parallel to operation of the hearing aid.”

Regarding claim 14, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of an amplifier and a signal converter (necessarily including an A/D converter) before the signal processor (Fig. 1 6 4), which corresponds to “the signal processing unit has a preprocessing arrangement for at least one of pre-amplification and filtering, and has an A/D converter for analog-digital (A/D) conversion of the acoustic signals.”

Art Unit: 2654

Regarding claim 17, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1); in addition, Zoels teaches the use of a signal converter (necessarily including a D/A converter) feeding an output transducer (Fig. 1, col. 2, Ins. 1-10), which corresponds to "at least one digital-analog converter is connected upstream of the actuator arrangement."

Regarding claims 19 and 20, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 17); furthermore, Zoels teaches the use of a digital hearing aid (with a signal converter and a signal processor) that can be employed for tinnitus masking (abstract, col. 2, Ins. 1-35), which corresponds to "the signal processing unit has a digital signal processor for processing A/D-converted acoustic sensor signals which have been preprocessed by means of the preprocessing arrangement and for generation of digital signals for tinnitus masking."

3. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Leonhard as applied to claim 1 above, and further in view of Markowitz (*Using Speech Recognition*, Prentice Hall, 1996), hereinafter referred to as Markowitz.

Regarding claims 5, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach "the speech analysis and speech recognition module and the speech synthesis module include a digitally implemented neural network." However, the examiner contends that this concept was well known in the art, as taught by Markowitz.

In the same field of endeavor, Markowitz teaches the techniques for using and implementing speech recognition. In addition, Markowitz teaches the use of neural networks for speech recognition (p. 44, §2.5.1 "Neural Networks for Speech Recognition," p. 46, §2.5.7 "Neural Networks for Speech Coding").

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the neural network techniques for speech recognition, as taught by Markowitz, for the superior classification techniques resulting from the use of neural networks.

4. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Leonhard as applied to claim 1 above, and further in view of Boss et al. (US Patent 5,933,805), hereinafter referred to as Boss.

Regarding claim 8, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach "the speech analysis and recognition module has an arrangement for detecting and extracting additional prosody of the speech information, and wherein the speech synthesis module is provided with an arrangement for taking into account the prosody of speech information in speech synthesis." However, the examiner contends that this concept was well known in the art, as taught by Boss.

In the same field of endeavor, Boss discloses a system for retaining prosody during speech analysis for later playback. Boss's system includes a speech analyzer

Art Unit: 2654

for detecting phonemes and a synthesizer for playback (abstract, Fig. 4 **48**, Fig. 5 **98** col. 2, ln. 61 through col. 3, ln. 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the features, as taught by Boss, for the purpose of improving the quality of the synthesized speech.

Regarding claim 9, Zoels in view of Leonhard and Boss teach everything claimed, as applied above (see claim 8), but Zoels in view of Leonhard do not specifically teach "the arrangement for detecting and extracting prosody of speech information is adapted for extraction of level and characteristic of fundamental speech frequency for voiced sounds, and wherein the arrangement for taking into account prosody of speech information in speech synthesis is adapted to effect the corresponding modulation of the output signal." However, the examiner contends that this concept was well known in the art, as taught by Boss.

Boss further teaches that during the extraction of the prosodic features, pitch (fundamental frequency), duration and amplitude (level) are detected and that these parameters are encoded and used during synthesis (Fig. 4 **56 58 60**, col. 3, lns. 5-19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the features, as taught by Boss, to more accurately reproduce the prosodic features of the analyzed speech.

Art Unit: 2654

5. Claims 11, 12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Leonhard as applied to claim 10 above, and further in view of well known prior art (MPEP 2144.03).

Regarding claim 11, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 10); in addition, Zoels teaches an automatic change in the control elements (in this case, a change in the generated signals for tinnitus therapy) (col. 5, Ins. 20-44), which corresponds to “means for automatically turning off the speech analysis and recognition module and the speech synthesis module [signal processing modules] ...”. But Zoels in view of Leonhard does not teach that the switching occurs “at a low level of interfering sound.” However, the examiner takes official notice of the fact that the automatic switching of noise-reducing signal processing software was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the control function of Zoels in view of Leonhard such that automatic switching could be used, making the operation of the unit more convenient for the user.

Regarding claim 12, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 10); in addition, Zoels teaches that the signal processing can be controlled by a control element (Fig. 4 17, col. 5, Ins. 20-44), which corresponds to “means for turning off the speech analysis and recognition module and the speech synthesis module ...”. But Zoels in view of Leonhard do not specifically teach that the means is “...by remote control.” However, the examiner takes official notice of the fact

Art Unit: 2654

that the use of a remote control for the purpose of controlling the operation of a hearing aid was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the control function of Zoels in view of Leonhard such that a remote control could be used, making the operation of the unit more convenient for the user.

Regarding claim 15, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 14), including the use of a signal converter (Zoels, Fig. 1 14), but Zoels in view of Leonhard do not specifically teach “the preprocessing arrangement comprises an anti-aliasing filter.” However, the examiner takes official notice of the fact that the use of an anti-aliasing filter before an analog to digital conversion for the purpose of reducing aliasing was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard to include an anti-aliasing filter, to improve the quality of the signal processing.

6. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Leonhard as applied to claim 1 above, and further in view of Magotra et al. (US Patent 5,608,803), hereinafter referred to as Magotra.

Regarding claim 16, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of a microphone connected to a signal converter (Fig. 1 6 4), but Zoels in view of Leonhard do not

specifically teach, "a plurality of acoustic sensors are provided, each of the acoustic sensors being upstream of an analog-digital converter." However, the examiner contends that this concept was well known in the art, as taught by Magotra.

In the same field of endeavor, Magotra discloses a programmable digital hearing aid where the outputs of two microphones are feed into A/D converters (Fig. 1 **10 1**, col. 3, lns 35-50).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing multiple acoustic inputs, as taught by Magotra, for the purpose of improved filtering capabilities.

Regarding claim 18, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of an output transducer connected to a signal converter (Fig. 1 **5 4**), but Zoels in view of Leonhard do not specifically teach that "the actuator arrangement comprises a plurality of actuators, and wherein a respective digital-analog converter is connected upstream of each actuator." However, the examiner contends that this concept was well known in the art, as taught by Magotra.

In the same field of endeavor, Magotra discloses a programmable digital hearing aid where stereo outputs feed earphones (Fig. 1 **8 11 13**, col. 3, lns. 40-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically

Art Unit: 2654

providing multiple acoustic outputs, as taught by Magotra, so that stereo output can be supported.

Response to Arguments

7. Applicants' arguments filed 10/02/03 have been fully considered but they are not persuasive.

8. Applicants assert on page 6:

However, Applicants respectfully submit that Leonhard fails to disclose that, although the methods of Leonhard may be used for speech recognition or for speech synthesis, the speech recognition and the speech synthesis are to be preformed in combination. Specifically, *Applicants respectfully submit that Leonhard fails to disclose that first an auditory signal has to undergo speech recognition and thereafter is restored by speech synthesis based on the result of the speech recognition.* (Italics added)

Leonhard discloses a system that can be used for speech recognition (col. 1, lines 8-10, "identification of speech signals") with subsequent speech synthesis (col. 1, lines 13-15, "used in conjunction with speech decompression," and col. 14, lines 21-22).

9. Applicants further assert:

Furthermore, Applicants respectfully submit that Leonhard only teaches that the methods may be used for speech recognition or for quality measurement of audio products such as hearing aids. (See in particular column 1, lines 5-11 and claims 8, 32 and 85) Therefore, Applicants respectfully submit that Leonhard fails to teach that the speech recognition or speech synthesis is to be used *in combination with a hearing aid.* (Italics added)

Art Unit: 2654

Leonhard teaches that among other things “[t]he result of the processing for identification of sound may be used... [in such] systems as hearing aids,” (col. 1, lines 9-10, col. 15, lines 30-33).

10. Applicants assert on page 8:

Accordingly, Applicants respectfully submit that Leonhard does not provide any teaching to combine speech recognition and speech synthesis and to implement such a combined process into a hearing aid for creating a system for rehabilitation of a hearing disorder which is able to offer speech from which interfering noise has been at least largely removed at the output of the system. Therefore, Leonhard would not have prompted the skilled artisan to modify the digital hearing aid of Zoels by implementing a speech recognition module and a speech synthesis module within the signal processing unit of the hearing aid. In contrast, Applicants respectfully submit that the Examiner is relying on impermissible hindsight to combine the teaching of Zoels and Leonhard.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In this case, Zoels teaches the use of a programmable hearing aid (title, abstract), and Leonhard teaches the use of speech recognition and synthesis in a variety of applications including the use of these techniques in hearing aids (see ¶'s 8 and 9).

Art Unit: 2654

11. Applicant asserts on page 8:

Accordingly, Applicants respectfully submit it would not have been obvious to the skilled person, in view of the cited references, to implement speech recognition and speech synthesis within a hearing aid.

Accordingly, and based on the requirements for establishing a rejection based on obviousness under 35 U.S.C. § 103, Applicants respectfully submit the rejection of claim 5 is improper. Accordingly, withdrawal of the rejection of claim 5 under 35 U.S.C. § 103(a) is respectfully requested.

See ¶'s 8 and 9, above. Furthermore, where Leonhard teaches the use of speech recognition and synthesis in a hearing aid, Markowitz teaches the well-know technique of using a neural network for speech recognition and coding (p. 44, p. 46).

12. Applicants assert on page 9:

The Examiner concedes that "neither Zoels nor Zoels in view of Leonhard teach that the switching occurs "at a low level of interfering sound.""

However, the Examiner takes Official Notice of the fact that automatic switching of noise-reducing signal processing software is well know in the art.

Applicants respectfully submit that the cited references, in combination with the Examiner's assertion of what is well known, at least fails to overcome the deficiencies as noted above in relation to Zoels and Leonhard. Accordingly, the cited references fail to teach, suggest or disclose each and every feature of claims 11, 12 and 15. Accordingly, the cited references fail to render obvious or anticipate these claims.

Withdrawal of the rejection of claims 11, 12 and 15 under 35 U.S.C. § 103(a) is respectfully requested.

See ¶'s 8 and 9, above. Furthermore, Applicants' failure to adequately traverse the Examiner's taking of Official Notice in the last office action is taken as an admission of the fact(s) noted.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks
P.O. Box 1450
Alexandria, VA 22313-1450

or faxed to:

(703) 872-9314

Hand-delivered responses should be brought to:

Crystal Park II
2121 Crystal Drive
Arlington, VA.
Sixth Floor (Receptionist)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. V. Paul Harper whose telephone number is (703)

Art Unit: 2654

305-4197. The examiner can normally be reached on Monday through Friday from 8:00 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil, can be reached on (703) 305-9645. The fax phone number for the Technology Center 2600 is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service office whose telephone number is (703) 306-0377.



VPH/vph
December 9, 2003



RICHEMOND DORVIL
SUPERVISORY PATENT EXAMINER